federal register

TUESDAY, JULY 16, 1974
WASHINGTON, D.C.

Volume 39 ■ Number 137

PART II

CONSUMER PRODUCT SAFETY COMMISSION

■

BICYCLES

Establishment of Safety Standards and Proposed Labeling Requirements

Title 16—Commercial Practices

CHAPTER II—CONSUMER PRODUCT SAFETY COMMISSION

SUBCHAPTER C—FEDERAL HAZARDOUS SUBSTANCES ACT REGULATIONS

PART 1500—HAZARDOUS SUBSTANCES AND ARTICLES; ADMINISTRATION AND ENFORCEMENT REGULATIONS

PART 1512—REQUIREMENTS FOR BICYCLES

Banning of Hazardous Bicycles; Establishment of Safety Requirements

The purpose of this document is to increase the safety of bicycles by promulgating 16 CFR Part 1512, a regulation that establishes safety requirements for bicycles and 16 CFR 1500.18(a)(12), a regulation which provides that bicycles intended for children introduced into interstate commerce on or after January 1, 1975, which do not meet the requirements of 16 CFR Part 1512 shall be considered banned hazardous substances. These regulations are issued under sections 2 (f)(1)(D), (q)(1)(A), and (s) and 3(e)(1) of the Federal Hazardous Substances Act (15 U.S.C. 1261, 1262), which authorize the Commission to declare toys and other articles intended for use by children to be banned hazardous substances if such toys or other articles present a "mechanical hazard" as defined in section 2(s) of the act.

Under section 4 of the act (15 U.S.C. 1263), it is unlawful for any person to introduce or deliver for introduction in interstate commerce any banned bicycle; receive a banned bicycle in interstate commerce and deliver or offer to deliver it; or alter a bicycle while in interstate commerce or being held for sale if the alteration results in the bicycle becoming a banned hazardous substance.

Persons committing such unlawful acts are subject to criminal penalties and any banned bicycle may be seized when introduced into or while in interstate commerce.

Additionally, under the repurchase regulations issued February 4, 1974 (39 FR 4469), the manufacturer, distributor, and retail dealer of a banned bicycle are required to give notice of the fact that they have sold a banned article or substance and to repurchase it from the person to whom they have sold it, reimbusing that person the reasonable and necessary expenses incurred in returning it.

Part 1512 requires that a bicycle have reasonable ease of assembly; have no exposed sharp edges, protrusions, or dangerous projections; have screws, bolts, or nuts used to attach or secure components of sufficient quality to perform satisfactorily; be equipped with brakes that meet the minimum performance standards specified in the regulation; have handlebars and a handlebar stem that allow safe and comfortable operation and that meet minimum strength requirements; have a drive chain that operates without catching or binding and that, in certain cases, is guarded by a chain or derailleur guard; have the recommended inflation pressure molded onto the sidewall of the tires and be equipped with tires capable of withstanding inflation to 110 percent of the recommended inflation pressure; have wheels that are complete, properly aligned, of adequate strength, and positively locked to the bicycle frame; have a fork and frame capable of withstanding specified forces without fracturing; have no feature on the seat that would substantially interfere with the rider's dismounting; be equiped with front, rear, side, and pedal reflectors that meet prescribed minimum performance standards; and be accompanied with adequate instructions for assembly, operation, and maintenance. Finally, the regulation requires that all individual components and the complete bicycle as an entity perform satisfactorily when subjected to a road test to simulate conditions of use by consumers.

The need for these requirements has been demonstrated by investigations, studies, and staff analysis available to the Commission and data provided by the National Electronic Injury Surveillance System (NEISS) which show that bicycles and the components which these requirements address are, or can be, a contributing factor in the serious injury and death of children.

Background

In the Federal Register of May 10, 1973 (38 FR 12300), the Commissioner of Food and Drugs proposed 21 CFR Part 191c, a regulation to establish safety requirements for bicycles intended for use by children less than 16 years old, and proposed 21 CFR 191.a(12), a regulation banning such bicycles if they did not meet the requirements of proposed 21 CFR Part 191c.

Effective May 14, 1973, functions under the Federal Hazardous Substances Act were transferred to the Consumer Product Safety Commission by section 30(a) of the Consumer Product Safety Act (Public Law 92-573; 86 Stat. 1231; 15 U.S.C. 2079(a)).

Subsequently, on September 27, 1973 (38 FR 27012), the Consumer Product Safety Commission revised and transferred the regulations under the Federal Hazardous Substances Act from 21 CFR to 16 CFR. Accordingly, proposed 21 CFR Part 191c and 21 CFR 191.9a(12) are acted upon below as 16 CFR Part 1512 and 16 CFR 1500.18(a)(12).

1. *Scope.* Section 191c.1 of the proposal of May 10, 1973, stated that the regulation would be applicable to "bicycles intended for use by children of less than 16 years of age." Almost half of the comments considered by the Commission concern the question of how the Commission would distinguish bicycles intended for use by children less than 16 years old, and therefore subject to the regulation, from bicycles not intended for such children and outside its coverage. In this connection, many of the comments express the view that a regulation intended to protect children should not be applied to bicycles designed and intended for adult use. These comments recommend that the regulation not be applied to lightweight, relatively expensive and sophisticated bicycles primarily used by adults for touring and other recreational purposes.

The Commission carefully considered the question of whether bicycles should be regulated under the Federal Hazardous Substances Act, and if so, whether the regulation should be made applicable to lightweight touring bicycles, a good percentage of which are purchased by adults. Petitions on this issue were received from the Bicycle Manufacturers Association requesting that bicycles be regulated under the Consumer Product Safety Act. These petitions were denied because the Commission believes the risk of injury associated with bicycles can be reduced to a sufficient extent by regulations issued under the Federal Hazardous Substances Act.

Section 2(f)(1)(D) of the Act includes in the definition of a hazardous substance "Any toy or other article intended for use by children which the Secretary by regulation determines, in accordance with section 3(e) of this Act, presents an electrical, mechanical, or thermal hazard." The Commission is aware that a large percentage of bicycles produced, particularly in recent years, are lightweight, relatively expensive and sophisticated bicycles which are bought by adults for commuting, touring, and other recreational purpose. However, these same bicycles can be, and are used by children and adolescents. It is clear there is no precise way of distinguishing between those bicycles intended exclusively for adults and those intended for children as well as adults. Neither the manufacturer nor the retailer can accurately predict who the subsequent user will be, nor can the seller predict whether the adult purchaser will be the exclusive user or whether the purchaser will give the bike to a child or share it with a child. Indeed, the bicycle may be purchased exclusively for adult use and when a child in the family become physically able to ride it the use may change. Moreover, an adult purchaser may subsequently sell the bicycle to a parent for a child's use.

Therefore, fully understanding the legal and practical considerations, the safety benefits the Commission believes will be derived from the regulations in a relatively short time, and the minor effect the regulations will have on the weight and performance of touring bicycles used by adults and children, the Commission promulgates the regulations, with limited exceptions for "racing bicycles" and "one-of-a-kind-bicycles," and makes them applicable to all bicycles as that term is defined in § 1512.2(a) below.

One group of comments state that "track bicycles," which are designed for the exclusive purpose of racing on a prepared track, should be exempted from the proposed regulation because its provisions would require modifications to such bicycles that would limit their performance in competition. The Commission concludes that exclusion of such

bicycles from coverage of the regulation would not seriously diminish the degree of protection offered by the regulation. The regulation therefore specifically exempts "track bicycles," as defined in § 1512.2(d) below, from its coverage.

Another group of interested parties request exemption of bicycles built to the order of individual consumers. The Commission finds that because many of the tests to determine whether a bicycle meets the requirements of Part 1512 are destructive, application of those tests to a bicycle built to the order of an individual consumer is not practicable. The Commission also concludes that the degree of protection afforded by the regulation would not be seriously diminished by exclusion of "one-of-a-kind" bicycles, as defined in § 1512.2(e), from coverage.

2. *Assembly and maintenance.* a. Proposed § 191c.3(b) specified that a bicycle sold to a consumer in an unassembled or partially assembled condition must be accompanied by any tools required for assembly of the bicycle other than a standard 7-inch flat-bladed screw driver, standard slip-joint pliers, and an air pump for tire inflation. Comments from one bicycle manufacturer, one importer, and one association of retailers urge elimination of this provision because it would require a consumer to absorb the cost of any tool furnished for assembly that he might already possess. These comments recommend instead a requirement that the consumer be advised of the tools necessary to assemble a bicycle sold in an unassembled or partially assembled condition.

The Commission adopts this suggestion because it will reduce the possibility of unnecessary additional cost to consumers and provide that consumers be informed of the tools needed for proper assembly. Accordingly, § 1512.19(b)(1) below provides that when a bicycle is sold in less than fully assembled condition, a list of tools necessary to assemble and adjust the bicycle shall be disclosed clearly on any promotional display material and on the shipping carton.

b. A retailer and a consumer group request that a provision be added to require disclosure of the size of rider that a bicycle can safely accommodate. The Commission concludes that such a provision would be appropriate for bicycles sold to consumers in an unassembled or partially assembled condition. Accordingly, § 1512.19(b)(2) below requires a drawing, illustrating the minimum leg length required of a rider to use such a bicycle, to appear on any display sales promotion material and on the shipping cartons of such bicycles.

c. Proposed § 191c.3(c) required that consumers be provided with instructions (in an owner's manual) for proper maintenance of brakes, control cables, bearing adjustments, wheel adjustments, lubrication, gearing adjustments, reflectors, handlebar and seat adjustments, and tires. An importer and a retailer comment that many consumers lack the skills necessary to make adjustments to bearings, brakes, and gears.

The Commission concludes that many consumers do possess the skills required to make such adjustments if given explicit instructions. Accordingly, § 1512.19(a)(3) below prescribes that the required instruction manual include directions for proper maintenance of brakes, control cables, bearing adjustments, wheel adjustments, lubrication, reflectors, tires, and handlebar and seat adjustments. In response to these two comments, however, § 1512.19(a)(3) provides for the instruction manual to specify types of maintenance which the manufacturer has determined to be beyond the capability of the consumer if it also lists the locations of service facilities where such maintenance can be obtained.

3. *Sharp edges.* Proposed § 191c.3(e) required that a bicycle have no unfinished sheared metal edges or other sharp parts. An association of bicycle manufacturers and a manufacturer of components request that the term "sharp part" be defined. A retailer suggests requiring rolled edges on bicycle parts made from metal of less than a specified thickness. Another retailer and a bicycle manufacturer suggest adding a test to establish the absence of sharp edges.

After considering these comments, the Commission concludes that the requirement proposed as § 191c.3(e) should be adopted with clarifying language. Accordingly, § 1512.4(b) below so provides. A proposal to add a sharp edge test to § 1512.18(a) is being considered and may be published in the FEDERAL REGISTER in the future.

4. *Protrusions.* a. Proposed section 191c.3(f) set forth certain restrictions on bicycle protrusions in general and specified certain limitations on protruding screw threads. Eleven comments state that adjustment for various bicycle parts and assemblies, such as derailleur mechanisms, are made with screws of small diameter that necessarily protrude beyond the proposed limits.

The intent of proposed § 191c.3(f) was to minimize exposure of protrusions that had the potential to produce injuries to susceptible parts of the rider's body, particularly arms and legs. The Commission agrees that the regulation as proposed could impose unnecessary restrictions. The Commission finds that any bicycle protrusion located in a position where it cannot make direct contact with the rider's arms or legs need not be regulated. Accordingly, only protrusions having the potential for direct contact with body parts are considered to be exposed and subject to the restrictions of § 1512.4(e). Screw threads are required to be limited in length in § 1512.4(h).

b. Proposed § 191c.3(f) also prohibited protrusions between the bicycle seat and the handlebar stem that extended more than 3½ inches to the rear of the handlebar stem. An association of domestic manufacturers and a foreign manufacturer request that this restriction be changed from 3½ to 5 inches.

The purpose of the restriction is to minimize injury to the rider's crotch area when he stops the bicycle and moves forward of the seat to place both feet on the ground, in which case he is astride the bicycle frame between the seat and the handlebar stem. When the rider places his hands on the handlebars, his arms can support his body sufficiently to prevent the body from advancing to within 3½ inches of the handlebar stem. Many bicycles now in use have gear shift levers on the handlebar stem that operate within the 3½ inch limit. Some bicycles, however, have oversize shift levers located on the top tube or extending more than 3½ inches to the rear of the handlebar stem that may make contact with the rider's crotch or legs with sufficient energy to cause injury. To avoid this uncomfortable situation, many riders will touch the ground with only one foot and keep the other leg over the seat, thereby assuming an unstable stop position. This greatly increases the chance of the rider's falling over the bicycle, either while stopped or while attempting to start again from the unstable position.

The Commission finds that styling rather than utility is the primary reason gear shift levers extend or are mounted more than 3½ inches to the rear of the handlebar stem. Accordingly, the Commission concludes that the 3½ inch limit should be retained (section 1512.4(g) below) because this requirement will reduce identifiable and unreasonable hazards without detracting from the utility of bicycles.

5. *Attaching hardware.* Proposed section 191c.5(c) required that screws, bolts, and studs used to attach or secure components of a bicycle be nonbrittle. One manufacturer comments that this requirement is unnecessarily restrictive and would preclude the use of the high-tensile hardware preferred by many manufacturers of bicycles and components to reduce weight. The Commission agrees and the requirement has been deleted from the attachment hardware provisions (§ 1512.4(d) below).

6. *Brake performance.* Proposed section 191c.8 set forth requirements for brake performance. The Department of Transportation suggests that a provision be added to allow a break-in period before brakes are subjected to performance testing. On the basis of information from tests of bicycles now on the market, using a variety of riders and a cement floor that provides a coefficient of friction with the bicycle tire of 0.50 to 0.55, the Commission finds that the brake performance tests specified in proposed § 191c.8 are both reasonable and practicable. The consumer should not be expected to operate a new bicycle for a specified break-in period before he can obtain adequate performance from the brakes. Accordingly, the modification requested by DOT has not been made.

Performance requirements for brakes appear in § 1512.5 below. Test procedures and criteria for handbrakes are in § 1512.18(d) and for footbrakes are in § 1512.18(e). Minor revisions and additions have been made to the footbrake force measurements of proposed § 191c.8(e) to standardize the results without requiring the use of overly sophisticated test instruments. The

linear relationship between the applied pedal force and the braking force has been changed from 10 percent in proposed § 191c.8(e) to 20 percent in § 1512.18(e)(2) below.

7. *Brake components.* a. Proposed § 191c.4(h)(7) required that caliper brakeshoes be replaceable and securely attached to the caliper brake assembly and that the brakeshoe holder have a retainer at each end of the brakeshoe to prevent the brakeshoe material from detaching upon application of the brakes. Six consumers, a manufacturer, two trade associations, and a retailer object to requiring a retainer at each end of the brakeshoe because the design specified in proposed § 191c.4(h)(7) is only one of several designs for brakeshoes that prevent loss of brakeshoe material upon application of the brakes.

The Commission concurs and the design requirement has been changed to a performance test to provide that caliper brakes retain the brakeshoes when the brakes are applied. The requirements applicable to caliper brakeshoes appear in § 1512.5(b)(6) below and the test procedure and criteria applicable to retention of brakeshoes are in § 1512.18(d)(2)(iii) and (iv).

b. Proposed § 191c.4(h)(8) required that footbrakes used on bicycles be actuated by applying force to the pedal in a direction opposite to that of the drive force and that the differential between the drive and brake positions of the crank not exceed 45°. Comments from a bicycle manufacturer, three manufacturers of components, and two trade associations state that the 45° limitation is unnecessarily restrictive and beyond the performance level of most currently available bicycles.

The Commission concludes that a satisfactory level of safety can be achieved if the requirement regarding the differential between the pedal drive and braking position is changed to not more than 60°. This appears in § 1512.5(c)(3) below.

8. *Braking surface.* Proposed § 191c.4(a)(4) required braking surfaces exposed to moisture from rain or other wet road conditions to be smooth and free of embossment or stippling. Five consumers, a consumer group, two trade associations, a manufacturer of components, and two retailers comment that embossed braking surfaces provide better braking performance than smooth braking surfaces under wet weather conditions. None of these comments, however, present substantiating data.

The Commission notes that the exclusion of embossed braking surfaces was based on results of limited test experience indicating that embossed braking surfaces exposed to moisture are lubricated continuously resulting in inadequate braking capability. CPSC staff have conducted additional tests using selected embossed braking surfaces for which claims of superior braking performance in wet weather have been made. Test results indicate that some of the embossed braking surfaces provided braking performance equal to or better than that obtained using smooth braking surfaces.

The conflicting nature and limited extent of the available test data indicate that additional testing of the entire bicycle braking system is required to formulate safety requirements for wet-braking performance. The provision of proposed § 191c.4(a)(4) precluding use of embossed braking surfaces therefore has not been adopted. The Commission may propose later to add requirements for wet-braking performance.

9. *Location of brake controls.* Proposed § 191c.3(g) provided that for bicycles equipped with handbrakes, the cable controlling the rear brake must be actuated by a hand lever mounted on the right handlebar, and the cable controlling the front brake must be actuated by a lever mounted on the left handlebar. A commenter requested that the consumer be allowed to specify an opposite arrangement to this if he so preferred. The Commission concludes that adopting this suggestion will not diminish the level of protection afforded. The provision (§ 1512.5(b)(8) below) has been changed accordingly.

10. *Handlebar stem.* Proposed § 191c.4(e) required that the handlebar stem be capable of supporting a load of 450 pounds without fracture. Two consumers question the validity of the 450-pound test load.

Injury investigations show that handlebar stem fracture is not an uncommon occurrence and often results in serious injury. The final stem requirements adopted by the Commission are designed and intended to prevent fracture failure. The aluminum and steel handlebar stems tested during the development of the 450-pound requirement all supported loads of from 900 to 1300 pounds before ductile failure occurred. To prevent stem failure resulting from repeated loading over a protracted period of time, the static load specified has been selected to represent a stress level at least twice as great as the normal level of use.

The requirements relating to handlebar stem insertion depth and stem strength are in § 1512.6 (a) and (b), and the procedure and criteria for testing the handlebar stem are in § 1512.18(g) below.

11. *Handlebars.* Proposed § 191c.4(i) specified permissible handlebar width and height above the seat to insure greater safety in use. The Commission has adopted these requirements (§ 1512.6 (c) below). Additionally, § 1512.6(d) prohibits unprotected handlebar ends.

The Bicycle Manufacturers of America recommends that any requirements for handlebars should specify force and deflection limits because safe performance is dependent upon the energy absorption ability of the handlebar assembly. It was pointed out that in some cases 100 pounds may be supported without deflection, yet 200 inch-pounds of energy would provide a reasonable level of safety. After due deliberation the Commission has adopted this concept in § 1512.6(e) below which specifies that the handlebar and clamps shall be tested in accordance with the handlebar test in § 1512.18(h).

12. *Pedals.* Pedal design variations and their usage were the subjects of fifteen comments representing the views of consumers, manufacturers, retailers, and a trade association. Among the comments made were accurate explanations that pedals used for road racing and touring have undergone design evolution through many years of usage under extreme conditions, and that the result is a high level of safety built into a number of the present designs. In recognition of these facts the Commission in the application of its regulation differentiates between the pedals with toe clips, which are designed for specialized usage (road racing, touring), and those intended for general everyday use by the casual rider.

Proposed § 194c.4(f) required that a label be securely attached to pedals intended for use with removable toe clips, reading "CAUTION—Use of this pedal without toe clips is dangerous." Section 1512.7(b) below requires that such pedals have the clips permanently attached to them. The label requirement has therefore been deleted.

Two comments request reexamination of the provision in proposed 194c.(f) specifying that pedals were to have right-hand and left-hand thread symmetry for the attachment of the pedals of their respective cranks. The Commission finds that the requirement is nonsafety related that use of such threads is universal in practice. Further, use of pedal bearings, which is dictated by modern design practice, virtually eliminates loosening torque. Consequently, the requirement has been deleted.

Proposed § 191c.4(g) prescribed a slip resistance test for pedals that did not include the use of leather against the pedal surface. Several comments suggest that this factor should be included. The question is under study by CPSC and the National Bureau of Standards. Consequently, the pedal slip test has not been adopted below. When this matter has been resolved, the Commission may propose to add pedal slip requirements to § 1512.18.

13. *Chain guards.* Twenty comments were received on the chain guard requirements of proposed § 191c.3(i), representing the views of consumers, manufacturers, retailers, and a retail trade association. Many contend that the requirements have very little hazard reduction value. The lower chain segment of a derailleur equipped bicycle has a slack chain and a reversible pedal feature that would, because of its design, be unlikely to inflict injury to a body part that might get between the chain and the sprocket. Some contend that the forward derailleur chain-shifting cage affords sufficient protection against the possibility of any body part entering the sprocket-chain assembly.

The Commission agrees with these comments and § 1512.9(a) below accordingly excludes from the chain guard requirements bicycles possessing a reverse free-wheeling capacity. Bare sprockets,

however, are subject to the sharp edge and protrusion requirements of § 1512.4 (b) and (e) below. Bicycles with nonreversible pedal rotation do represent an injury hazard potential and are therefore subject to § 1512.9(a) below.

14. *Drive chain.* Proposed § 191c.4(k) required that the drive chain operate over each sprocket without bending and that the tensile strength of the chain be not less than 1,800 pounds. Two consumers, two manufacturers, a retail trade association, and an importer question the validity of the 1,800-pound tensile strength requirement.

The 1,800-pound value was selected to coincide with the minimum value specified by the International Standards Organization (ISO) in their standard R606. Information provided to the Commission indicates that chain breakage is not a current problem area because industry has adopted the ISO standard, which has specifications that allow for wear and life-cycle degradation.

Consequently, the proposed drive-chain requirements are adopted (§ 1512.8 below) except that the minimum drive chain tensile strength for sidewalk bicycles shall be 1,400 pounds.

15. *Tires.* Proposed § 191c.3(j) requires the manufacturer's recommended inflation pressure to be molded into the sidewall of the bicycle tire, in characters not less than one-eighth of an inch high. Additionally, the bicycle tire must be compatible with the rim design and capable of remaining intact on the rim with no evidence of creeping after inflation to 110 percent of the maximum recommended inflation.

Eighteen responses from consumers, manufacturers, and an industry trade association commented on proposed section 191c.3(j). Almost all observe that the sidewalls of tubular sew-up tires are not molded and cannot support a legend of recommended tire pressure. The Commission finds that tubular sew-up tires are used principally by riders who demand extremely high performance. Since such tires are used in conjunction with special rims, their use by casual recreational riders is in most cases restricted to adults. The Commission concludes that tubular sew-up tires and nonpneumatic tires should be exempted from the molding requirement (§ 1512.10 below).

A tire manufacturer recommends that all tires and rims be required to meet the current Tire and Rim Association Standard. The Commission finds the current TRA standard to be design oriented and that adopting it would tend to restrict inovative development of safer tires and rims.

A comment suggests that the inflation pressure required for the proof test be increased from the proposed 110 percent to 200 percent of the manufacturer's recommended inflation pressure. The Commission finds that the 110-percent specification will help assure adequate sealing of the tire bead to the rim and that requiring 200 percent of the recommended inflation pressure might cause unnecessarily heavy tire design without significant additional benefit. Accordingly, § 1512.10 below retains the 110-percent requirement, but also requires the tire to pass the rim test prescribed by § 1512.18(j) while inflated at 110 percent of the manufacturer's recommended inflation pressure.

16. *Rim test.* Proposed § 191c.4(a)(6) prescribed a rim test requiring that the fully assembled wheel assembly be subjected to a load of 450 pounds for not less than 30 seconds and then be inspected for compliance with proposed § 191c.4(a)(1), which required that spokes be tight, that any spoke that rattles be considered loose, and that there be no missing spokes. Three comments request clarification and/or reduction of the test load applied to the axle in the rim test.

The proposed test was designed to simulate spoke loading under actual roadway conditions. Hazards associated with wheel collapse will be minimized if the spokes do not fail or pull out under conditions of high loading. The stress level induced under the proposed test conditions is well below the yield stress of steel spokes, yet is high enough to simulate a bicycle running through a pot hole at moderate speeds. The intent of the test is to insure the integrity of the entire wheel assembly.

The Commission concludes that the test should be adopted as proposed. The test provisions are in § 1512.18(j) below.

17. *Wheel hubs.* Proposed § 191c.4(a)(7) required (1) that a bicycle have removable wheels and a positive wheel locking device secure against a minimum of 10 inch-pounds of torque; (2) that the levers of quick-release hubs indicate whether the levers are in a locked or unlocked position; (3) that the quick-release clamping action emboss the frame or fork when locked; and (4) that threaded nuts used to secure the wheel axle to the frame or fork incorporate a locking provision.

Proposed § 191c.4(a)(7)(i), (ii), and (iii) required respectively (1) a positive retention feature for front hubs that use threaded nuts, (2) a positive retention feature for attaching rear hubs to the frame, and (3) a spoke protection disc and provision for preventing the drive chain from interfering with the rotation of the rear wheel.

Twenty comments on these provisions were received from consumers, manufacturers of component parts, a bicycle manufacturers' trade association, a medical association, importers, retailers, and a retail association.

On the basis of the available facts and consideration of the comments, the Commission has established requirements for wheel hubs in section 1512.12 and for derailleur guards in § 1512.9(b) below. These provisions are not applicable to sidewalk bicycles. Section 1512.12 specifies that: (1) Wheels shall be secured to the frame with a positive locking device (locking nuts or threaded axles shall have rotation of at least 180° from finger-tight condition to full tightness); (2) quick-release devices shall be adjustable to permit user to set proper tightness; (3) a quick-release hub shall have levers clearly visible to the rider and shall indicate whether the levers are in a locked or unlocked position; (4) the quick-release clamp action shall emboss the frame; and (5) nonquick-release front hubs shall have a positive retention device. Section 1512.9(b) requires that derailleur rear wheels be guarded to prevent the drive chain from stopping rotation of the wheel through improper adjustments or damage.

The Commission has not adopted the requirement in proposed § 191c.4(a)(7) for removable wheels and for a wheel locking device to be secure against a minimum of 10 inch-pounds of torque, because these requirements are not inherently safety-related.

For the same reason, the Commission has not adopted the requirement for a positive retention feature for attaching rear hubs to the frame proposed in § 191c.4(a)(7)(ii). Requirements relating to rear wheel derailleurs, proposed in § 191c.4(a)(7)(ii), have been revised and appear in § 1512.9(b) below.

18. *Fork test.* A bicycle manufacturer, a manufacturer of bicycle components, five associations, and one retailer commented on the requirements of proposed section 194c.4 (b) and (c) relating to the front fork of a bicycle.

Proposed § 194c.4(b) required that the front fork be capable of absorbing 350 inch-pounds of energy without fracture. Proposed § 194c.4(c) specified the conditions for conducting the fork test. A salient feature of this test was that the 350 inch-pounds of energy absorption must be obtained at a 2-inch deflection.

The comments indicate some confusion or misunderstanding of the fork test. The test is a destructive type designed to establish that (1) the front fork will take a reasonable load prior to failure and (2) that failure will occur through a ductile mechanism rather than by brittle fracture.

One comment suggests that the 350 inch-pounds of energy absorption be obtained at less than the specified 2-inch deflection. Two leading foreign manufacturers suggest that 350 inch-pounds of energy absorption be measured at a deflection of 2.5 inches to permit the design of lightweight frames in the larger wheel sizes.

After considering the comments and other relevant information, including the result of tests performed at the National Bureau of Standards, the Commission concludes that the proposed fork test should be modified by changing the deflection from 2 to 2.5 inches (section 1512.18(k)(1) below). Inducing a full deflection, as required, is necessary to insure ductility as a deterrent to failure through brittle fracture. Section 1512.13 exempts sidewalk bicycles from the fork test.

19. *Frame.* Three comments question the level of protection provided by the frame test proposed in § 191c.4(d): "A bicycle frame shall be capable of supporting the fork without fracture when a load of 200 pounds is applied to the fork at the axle attachment point against

the direction of the rake in line with the rear wheel axle."

A bicycle frame should support the fork under reasonable frontal loading conditions without suffering fracture or deformation that significantly limits the steering angle over which the front wheel may be turned. Accordingly, the Commission endorses retention of the frame test. To provide more objective and practicable methods for compliance, however, § 1515.14 below describes the mechanical strength the bicycle frame must exhibit and § 1512.18(k)(2) describes the procedure and criteria for testing a bicycle frame to determine its strength and, therefore, its relative safety.

20. *Seat clamps and load test.* Proposed § 191c.4(j) specified that "the seat adjustment clamps shall resist without movement a torque of 25 ft-lb applied in a horizontal plane and a torque of 75 ft-lb applied in a vertical plane." A foreign manufacturer suggests that the seat clamp integrity be measured by the application of force to the extremities of the seat since bicycle seats are available in a wide variety of sizes and shapes.

The Commission agrees and the regulations have been changed accordingly (§§ 1512.15(c) and 1512.18(l) below).

The Commission also concludes that a direct force, as opposed to torque force, should be applied to the seat when testing its movement in any direction under normal conditions of use. The test procedures in § 1512.18(l) below insure the integrity of the clamp regardless of the seat size. Through simulation of actual use conditions, the Commission has determined that these requirements and test procedures on seat clamps will provide a basic level of safety for the construction of bicycles.

21. *Rear reflector.* Regarding proposed § 191c.6(b), several commenters request that rear reflector location dimensions be specified and that the reference to appropriate clothing be eliminated in favor of specific mounting directions for the rear reflectors.

The Commission agrees and therefore § 1512.16(d) below prescribes detailed mounting instructions for rear reflectors. Section 1512.18(m) outlines the procedure and criteria for testing reflector mounting and alignment.

22. *Side reflectors.* Twelve commenters suggest that proposed § 191c.6(d) be changed to specify a more definite location for the side reflectors.

The Commission agrees and § 1512.16(b) below accordingly details the method to be utilized in the placing of side reflectors.

23. *Prismatic reflector performance.* Seven manufacturers of bicycle parts, four bicycle manufacturers, seven consumers, an industrial standards association, an importer, and a retailer question proposed § 191c.6(e), which detailed the photometric requirements for all bicycle reflectors. They contend that the values given in the Society of Automotive Engineers' standard SAEJ594e are adequate and appropriate for automobiles and therefore should be adopted for bicycles.

The proposed regulation increased the performance requirements of standard SAEJ594e by 50 percent. The Commission finds that this increase in performance capabilities is attainable and well within the technical competence of manufacturers. The increase will make the bicycle and its rider more visible and therefore safer. Accordingly, the proposed requirements for the prismatic reflector test have been retained (section 1512.18(n) below).

The commenters also object to the provisions of proposed § 191c.6 (c) and (d) that provided for optional clear or colorless reflectors on the side of the front wheel and on the pedals, contending that such reflectors are inconsistent with the Department of Transportation's color scheme of amber for forward and red for rear.

The Commission finds that clear reflectors give back more light and that amber and red reflectors have filters which decrease the amount of returned light. The Commission therefore endorses the use of clear reflectors as providing increased safety for the rider. The Commission does not find it essential to follow DOT's position on reflectors since it is designed for automobiles, not for bicycles.

Nevertheless, the Commission has retained an optional approach to the coloring of reflectors in § 1515.16 (d) and (e) below because many local jurisdictions currently require the amber-red color scheme.

24. *Pedal clearance.* Proposed § 191c.3 (h) specified that the toe clearance, with respect to pedals, shall be at least 4½ inches measured from the rotation axis of the pedal at the center of the foot tread forward to the tire or fender surface. Fourteen consumers, a manufacturer, two trade associations and a retailer object to this requirement, noting that racing and touring bicycles have a reduced toe clearance necessary to insure maneuverability at high speeds. They comment that this reduced toe clearance is not a problem because bicycles used for touring and racing are equipped with toe clips that keep the foot in place with respect to the pedal.

The 4½-inch specification was chosen to provide clearance for a shoe size of an upper percentile 15-year-old rider. The Commission has reexamined its position on pedal clearance and § 1512.17(d) below provides that bicycles not equipped with positive foot retaining devices, such as toe clips, shall have at least a 3½-inch clearance between the pedal and the front tire and fender, when turned to any position. This change from 4½ to 3½ inches represents a toe clearance that the Commission concludes will offer the required protection to the younger rider and not restrict development of functional and safety features for the older, more experienced rider.

In addition, proposed § 191c.3(h), required that the pedals allow 25° minimum lateral tilt of the bicycle from the vertical when the pedal crank is in its lowest position and the tread surface of the pedal is parallel to the ground plane.

One comment suggested that the 25° requirement be reduced to 20° because smaller bicycles covered by the regulation, as a practical matter, do not attain a lateral tilt of 25° because of the slower speeds these bicycles are capable of.

The Commission considered this comment and concludes that an inclination of up to 25° is required to provide an ample margin of safety under reasonable operating conditions during mounting or demounting as well as maneuvering.

Therefore, this requirement is retained in § 1512.17 below.

25. *Retroflective tire sidewalls.* Proposed § 191c.6(f), dealing with reflectance requirements for tire sidewalls, drew comments from six consumers, two manufacturers of bicycle parts, a trade association, and a State department of public health (Alabama). The comments indicate some confusion with the mathematical expressions contained in the proposal.

The Commission points out that the proposal described a new procedure to test the effectiveness of reflective sidewalls that is compatible with the prismatic reflector testing results. Due to the apparent confusion caused by the format of the proposed test for reflectance, this section has been rewritten for clarification. The mathematical expressions in § 1512.18(o) below, however, have been retained in their original proposed form.

26. *Road test.* Two retailers, a manufacturer of bicycle parts, a consumer, and the Department of Transportation question proposed § 191c.7 which prescribed the bicycle road test. Three commenters requested that a test speed be specified; one suggested 10 m.p.h. as a possible test speed.

The Commission agrees that a test speed should be specified and finds that 15 m.p.h. is a reasonable speed to be maintained over the test course (§ 1512.18(p)(1) below).

Commenters express concern that some classes of lightweight equipment would be unable to withstand the rigors of the proposed road test.

Tests demonstrate that lightweight bicycles, fitted with lightweight rims and sew-up tubular tires, will be able to pass the road test with a 215-pound rider properly seated and traveling at 30 feet per second. The Commission, therefore, finds no reason for modifying the road test procedures (§ 1512.18(p) below).

27. *Qualifications for sidewalk bicycles.* A manufacturer of sidewalk bicycles objects to proposed § 191c.9(e), which described the brake performance required for sidewalk bicycles. The commenter requests that the footbrake not be restricted to the coaster type and has demonstrated that an alternative footbrake is available and effective for use by children.

The Commission encourages innovation that does not increase hazards and therefore agrees to deletion of the restriction. Accordingly, § 1512.18(f) below contains no requirement for the type of footbrake used on sidewalk bicycles; it

requires only that a specified braking force be maintained.

Another manufacturer requests reduction of the chain strength requirement for sidewalk bicycles contained in proposed § 191c.4(k). The proposal required the tensile strength per single strand of the drive chain to be not less than 1,800 pounds.

In consideration of the reduced rider loading for sidewalk bicycles, the Commission has revised this requirement and section 1512.8 below provides that the tensile strength per single strand of the drive chain shall be not less than 1,400 pounds for sidewalk bicycles.

28. *Effective date.* The proposal of May 10, 1973, did not suggest an effective date for the provisions of the regulations. Since the establishment of the Consumer Product Safety Commission on May 14, 1973, the Commission has thoroughly investigated the extent to which manufacturers of bicycles and bicycle components currently meet the requirements of the regulations, and the modifications that would be required of those bicycles and bicycle components now in production to comply with the regulations. Included in the investigation were discussion and comments from persons concerned with the requirements for reflectors. On the basis of this investigation, the Commission concludes that adequate time for redesign and retooling will be available if the requirements of § 1500.18(a)(12) and Part 1512 become effective January 1, 1975. Consequently, the provisions of § 1500.18(a)(12) and Part 1512, promulgated below, shall be applicable to bicycles (except "tract bicycles" and "one-of-a-kind bicycles") that are introduced into interstate commerce on or after January 1, 1975.

Although not suggested by the comments, the Commission is proposing an amendment to 16 CFR 1512.19 to require a method of labeling bicycles to indicate that a bicycle is subject to the regulations and is in conformance with the requirements of 16 CFR Part 1512. The purpose of this amendment is to aid consumers in making a knowledgeable choice between conforming and nonconforming bicycles and to enable the Commission to identify those bicycles that have been manufactured in compliance with the requirements of 16 CFR Part 1512.

Accordingly, pursuant to provisions of the Federal Hazardous Substances Act (secs. 2(f)(1)(D), (q)(1)(A), (s), 3(e)(1), 74 Stat. 372, 374, 375, as amended 80 Stat. 1304–05, 83 Stat. 187–89; 15 U.S.C 1261, 1262) and under authority vested in the Commission by the Consumer Product Safety Act (sec. 30(a), 86 Stat. 1231; 15 U.S.C. 2079(a)), a new paragraph (a)(12) is added to § 1500.18 and a new Part 1512 is added to Title 16, Chapter II, as follows (although unchanged, the introductory text of § 1500.18(a) is included below for context):

§ 1500.18 Banned toys and other banned articles intended for use by children.

(a) *Toys and other children's articles presenting mechanical hazards.* Under the authority of section 2(f)(1)(D) of the act and pursuant to provisions of section 3(e) of the act, the Commission has determined that the following types of toys or other articles intended for use by children present a mechanical hazard within the meaning of section 2(s) of the act because in normal use, or when subjected to reasonably forseeable damage or abuse, the design or manufacture presents an unreasonable risk of personal injury or illness:

* * * * *

(12) Any bicycle as defined in § 1512.2(a) of this chapter (except a bicycle that is a "track bicycle" or a "one-of-a-kind bicycle" as defined in § 1512.2 (d) and (e) of this chapter) that is introduced into interstate commerce on or after January 1, 1975, and that does not comply with the requirements of Part 1512 of this chapter.

* * * * *

Sec.

1512.1 Scope.
1512.2 Definitions.
1512.3 Requirements in general.
1512.4 Mechanical requirements.
1512.5 Requirements for braking system.
1512.6 Requirements for steering system.
1512.7 Requirements for pedals.
1512.8 Requirements for drive chain.
1512.9 Requirements for protective guards.
1512.10 Requirements for tires.
1512.11 Requirements for wheels.
1512.12 Requirements for wheel hubs.
1512.13 Requirements for front fork.
1512.14 Requirements for frame.
1512.15 Requirements for seat.
1512.16 Requirements for reflectors.
1512.17 Other requirements.
1512.18 Tests and test procedures.
1512.19 Instructions and labeling.
1512.20 Separability.

AUTHORITY: Secs. 2(f)(1)(D), (q)(1)(A), (s), 3(e)(1), 74 Stat. 372, 374, 375, as amended, 80 Stat. 1304–05, 83 Stat. 187–89 (15 U.S.C. 1261, 1262).

§ 1512.1 Scope.

This part sets forth the requirements for a bicycle as defined in § 1512.2(a) (except a bicycle that is a "track bicycle" or a "one-of-a-kind bicycle" as defined in § 1512.2 (d) and (e)) which is not a banned article under § 1500.18(a)(12) of this chapter.

§ 1512.2 Definitions.

For the purposes of this part:

(a) "Bicycle" means a two-wheeled vehicle having a rear drive wheel that is solely human-powered.

(b) "Sidewalk bicycle" means a bicycle with a seat height of no more than 635 mm (25.0 in.); the seat height is measured with the seat adjusted to its highest position.

(c) "Seat height" means the dimension from the point on the seat surface intersected by the seat post center line (or the center of the seating area if no seat post exists) and the ground plane, as measured with the wheels aligned and in a plane normal to the ground plane.

(d) "Track bicycle" means a bicycle designed and intended for sale as a competitive machine having tubular tires, single crank-to-wheel ratio, and no freewheeling feature between the rear wheel and the crank.

(e) "One-of-a-kind bicycle" means a bicycle that is uniquely constructed to the order of an individual consumer other than by assembly of stock or production parts.

(f) "Normal riding position" means that the rider is seated on the bicycle with both feet on the pedals and both hands on the handlegrips (and in a position that allows operation of handbrake levers if so equipped); the seat and handlebars may be adjusted to positions judged by the rider to be comfortable.

§ 1512.3 Requirements in general.

Any bicycle subject to the regulations in this part shall meet the requirements of this part in the condition in which it is offered for sale to consumers; any bicycle offered for sale to consumers in a disassembled or partially assembled condition shall meet these requirements after assembly according to the manufacturer's instructions.

§ 1512.4 Mechanical requirements.

(a) *Assembly.* Bicycles shall be manufactured such that mechanical skills required of the consumer for assembly shall not exceed those possessed by an adult of normal intelligence and ability.

(b) *Sharp edges.* There shall be no unfinished sheared metal edges or other sharp parts on bicycles that are, or may be, exposed to hands or legs; sheared metal edges that are not rolled shall be finished such as to remove any feathering or beveling of edges, or any burrs or spurs caused during the shearing process.

(c) *Integrity.* There shall be no visible fracture of the frame or of any steering, wheel, pedal, crank, or brake system component resulting from testing in accordance with: The handbrake loading and performance test, § 1512.18(d); the foot brake force and performance test, § 1512.18(e); and the road test, § 1512.18 (p) (or the sidewalk bicycle proof test, § 1512.18(q)).

(d) *Attachment hardware.* All screws, bolts, or nuts used to attach or secure components shall not fracture, loosen, or otherwise fail their intended function during the tests required in this part. All threaded hardware shall be of sufficient quality to allow adjustments and maintenance. Recommended quality thread form is specified in Handbook H28, "Screw Thread Standards for Federal Services",[1] issued by the National

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[1] Copies may be obtained from:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Bureau of Standards, Department of Commerce; recommended mechanical properties are specified in ISO Recommendation R898, "Mechanical Properties of Fasteners." [2]

(e) *Protrusions.* The assembled bicycle shall be tested for exposed protrusion in accordance with the exposed protrusion test, 1512.18(b); protrusions having ends within 25 mm (1.0 in.) of an adjacent surface that do not project more than 7.8 mm (5/16 in.) beyond the surface or that cannot come in contact with the surface of the cylinder specified are not exposed protrusions. Exposed protrusions greater than 7.8 mm (5/16 in.) long having a major end dimension greater than 12.7 mm (½ in.) shall have at least a 6.3 mm (¼ in.) radius; the minor dimension shall not be less than 3.2 mm (⅛ in.).

(f) *Protective caps.* Protective caps used to mask exposed protrusions shall be tested in accordance with the protective cap and end-mounted devices test, 1512.18(c), and shall withstand a removal force of 66.7N (15 lbf).

(g) *Projections.* There shall be no projection located within the area bounded by (1) a line 89 mm (3½ in.) to the rear and parallel with the handlebar stem, (2) a verticle line through the center of the seat area, (3) a line through the center of the top bar, and (4) a line connecting the front of the seat (when adjusted to its highest position) with the point of intersection of the handbar and handlebar stem.

(h) *Screw length.* Screw lengths shall be such that the threads of the internally threaded fastener are fully engaged by the screw (or the threads of the internally threaded fastener are engaged for a length of more than one screw diameter); and shall be limited to a length of one major diameter of the screw beyond the internally threaded mating member except that those exposed to any part of a rider's body in a normal riding position shall be limited to 3.2 mm (⅛ in.) extension beyond the internally threaded mating member.

(i) *Control cable ends.* Ends of all control cables shall be provided with protective caps or otherwise treated to prevent unraveling. Protective caps shall be tested in accordance with the protective cap and end-mounted devices test, § 1512.18(c), and shall withstand a pull of 8.9N (2.0 lbf).

(j) *Control cable abrasion.* Control cables shall not rub or abrade over fixed parts and shall enter and exit cable sheaths in a direction in line with the sheath entrance and exit so as to prevent abrading.

§ 1512.5 Requirements for braking system.

(a) *Braking system.* Bicycles shall be equipped with front- and rear-wheel brakes or rear-wheel brakes only.

(b) *Handbrakes.* Handbrakes shall be tested at least ten times by applying a force sufficient to cause the handlever to contact the handlebar, or a maximum of 445 N (100 lbf), in accordance with the loading test, 1512.18(d)(2), and shall be rocked back and forth with the weight of a 68.1 kg (150 lb) rider on the seat with the same handbrake force applied in accordance with the rocking test, 1512.18(d)(2)(iii); there shall be no visible fractures, failures, movement of clamps, or misalignment of brake components.

(1) *Stopping distance.* A bicycle equipped with only handbrakes shall be tested for stopping distance by a rider of at least 68.1 kg (150 lb) weight in accordance with the performance test, 1512.18(d)(2) (v) and (vi), and shall have a stopping distance of no greater than 4.5 m (15 ft.) from the actual test speed as determined by the equivalent ground speed specified in 1512.18(d)(2)(vi).

(2) *Hand lever access.* Hand lever mechanisms shall be located on the handlebars in a position that is readily accessible to the rider when in a normal riding position.

(3) *Grip dimension.* The grip dimension (maximum outside dimension between the brake hand lever and the handlebars in the plane perpendicular to the center line of the handgrip) shall not exceed 89 mm (3½ in.) at any point between the cable end of the lever and lever midpoint; the grip dimension for sidewalk bicycles shall not exceed 76 mm (3 in.). The grip dimension may increase toward the open end of the lever but shall not increase by more than 12.7 mm (½ in.) except for the last 12.7 mm (½ in.) of the lever.

(4) *Attachment.* Brake assemblies shall be securely attached to the frame by means of a locking device such as a lock washer and locknut or equivalent and shall not loosen during the rocking test, 1512.18(d)(2)(iii). The cable anchor bolt shall not cut any of the cable strands.

(5) *Operating force.* A force of less than 44.5 N (10 lbf) shall cause the brake pads to contact the braking surface of the wheel when applied to the handlever at a point 25 mm (1.0 in.) from the open end of the handlever.

(6) *Pad and pad holders.* Caliper brake pad shall be replaceable and adjustable to engage the braking surface without contacting the tire or spokes and the pad holders shall be securely attached to the caliper assembly. The brake pad material shall be retained in its holder without movement when the bicycle is loaded with a rider of at least 68.1 kg (150 lb) weight and is rocked forward and backward as specified in the rocking test, 1512.18(d)(2)(iii).

(7) *Pad material.* Brake pad material when placed in a pre-heated oven at a temperature of at least 121°±3° C (250°±5° F) for 30 minutes shall not melt or blister.

(8) *Hand lever location.* The rear brake shall be actuated by a control located on the right handlebar and the front brake shall be actuated by a control located on the left handlebar. The left-hand/right-hand locations may be reversed in accordance with an individual customer order.

(9) *Hand lever extensions.* Bicycles equipped with hand lever extensions shall be tested with the extension levers in place and the hand lever extensions shall also be considered to be hand levers.

(c) *Footbrakes.* All footbrakes shall be tested in accordance with the force test, 1512.18(e)(2), and the measured braking force shall not be less than 178 N (40 lbf) for an applied pedal force of 311 N (70 lbf).

(1) *Stopping distance.* Bicycles equipped with footbrakes shall be tested in accordance with the performance test, 1512.18(e)(3), by a rider of at least 68.1 kg (150 lb) weight and shall have a stopping distance of no greater than 4.5 m (15 ft.) from an actual test speed of at least 16 km/hr (10 mph). If the bicycle has a footbrake only and the equivalent ground speed of the bicycle is in excess of 24 km/hr (15 mph) (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute), the stopping distance shall be 4.5 m (15 ft.) from an actual test speed of 24 km/hr (15 mph) or greater.

(2) *Operating force.* Footbrakes shall be actuated by a force applied to the pedal in a direction opposite to that of the drive force.

(3) *Crank differential.* The differential between the drive and brake positions of the crank shall be not more than 60° with the crank held against each position under a torque of at least 13.6 N-m (10 ft-lb).

(4) *Independent operation.* The brake mechanism shall function independently of any drive-gear positions or adjustments.

(d) *Footbrakes and handbrakes in combination.* Bicycles equipped with foot brakes and handbrakes shall meet all the requirements for footbrakes in 1512.5(c), including the tests specified. In addition, if the equivalent ground speed is 24 km/hr (15 mph) or greater (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute), the actual test speed specified in 1512.18(e)(3) shall be increased to 24 km/hr (15 mph) and both braking systems may be actuated to achieve the required stopping distance of 4.5 m (15 ft.)

(e) *Sidewalk bicycles.*

(1) Sidewalk bicycles shall not have handbrakes only.

(2) Sidewalk bicycles with a seat height of 0.56m (22 in.) or greater (with seat height adjusted to its lowest position) shall be equipped with a footbrake meeting all the footbrake requirements of 1512.5(c), including the specified tests except that the braking force transmitted to the rear wheel shall be in accordance with the Sidewalk Bicycle Footbrake Force Test, § 1512.18(f).

(3) Sidewalk bicycles with a seat height less than 0.56 (22 in.) (with seat height adjusted to its lowest position) shall not have a free-wheel feature. Such

[2] Copies may be obtained from:
American National Standards Institute
1430 Broadway
New York, New York 10018

sidewalk bicycles equipped with a footbrake shall be tested for brake force in accordance with the sidewalk bicycle footbrake force test, § 1512.18(f). Such sidewalk bicycles not equipped with brakes shall be identified with a permanent label clearly visible from a distance of 3.0 m (10 ft.) in daylight conditions and promotional display material and shipping cartons shall prominently display the words "No Brakes."

§ 1512.6 Requirements for steering system.

(a) *Handlebar stem insertion mark.* The handlebar stem shall contain a permanent ring or mark which clearly indicates the minimum insertion depth of the handlebar stem into the fork assembly. The insertion mark shall not affect the structural integrity of the stem and shall not be less than 2½ times the stem diameter from the lowest point of the stem. The stem strength shall be maintained for at least a length of one shaft diameter below the mark.

(b) *Handlebar stem strength.* The handlebar stem shall be tested for strength in accordance with the handlebar stem test, § 1512.18(g), and shall withstand a force of 2000 N (450 lbf) for bicycles and 1000 N (225 lbf) for sidewalk bicycles.

(c) *Handlebar.* Handlebars shall allow comfortable and safe control of the bicycle. The inside dimension at the ends of the handlebars shall not be less than 356 mm (14 in.) nor more than 712 mm (28 in.) apart. Handlebar ends shall be symmetrically located with respect to the longitudinal axis of the bicycle and no more than 406 mm (16 in.) above the seat surface when the seat is in its lowest position and the handlebar ends are in their highest position.

(d) *Handlebar ends.* The ends of the handlebars shall be capped or otherwise covered. Handgrips, end plugs, control shifters, or other end-mounted devices shall be secure against a removal force of no less than 66.8 N (15 lbf) in accordance with the protective cap and end-mounted devices test, § 1512.18(c).

(e) *Handlebar and clamps.* The handlebar and clamps shall be tested in accordance with the handlebar test, § 1512.18(h).

§ 1512.7 Requirements for pedals.

(a) *Construction.* Pedals shall have right-hand/left-hand symmetry and the tread shall be an integral part of the pedal construction to the extent that removal of the tread material would substantially destroy the pedal. The tread surface shall be present on both top and bottom surfaces of the pedal except that if the pedal has a definite preferred position, the tread surface need only be on the surface presented to the rider's foot.

(b) *Toe clips.* Pedals intended to be used only with toe clips shall have toe clips permanently attached to them and need not have tread surfaces. Pedals designed for optional use of toe clips shall have tread surfaces.

(c) *Pedal reflectors.* Pedals for bicycles other than sidewalk bicycles shall have reflectors in accordance with § 1512.16(e). Pedals for sidewalk bicycles are not required to have reflectors.

§ 1512.8 Requirements for drive chain.

The drive chain shall operate over the sprockets without catching or binding. The tensile strength of the drive chain shall be no less than 8010 N (1,800 lb) or 6230 N (1,400 lb) for sidewalk bicycles.

§ 1512.9 Requirements for protective guards.

(a) *Chain guard.* Bicycles having a single sprocket ratio that cannot be freewheeled in a direction opposite to the drive direction shall have the drive sprocket and chain guarded where the chain engages the sprocket. Such chain guard shall prevent a rod of 9.4 mm (⅜ in.) diameter and 76 mm (3.0 in.) length from entrapment between the upper junction of the chain and the sprocket when introduced from the chain side of the bicycle in any direction within 45° from a line normal to the sprocket.

(b) *Derailleur guard.* Derailleurs shall be guarded to prevent the drive chain from interfering with or stopping the rotation of the wheel through improper adjustments or damage.

§ 1512.10 Requirements for tires.

The manufacturer's recommended inflation pressure shall be molded into or onto the sidewall of the tire with lettering no less than 3.2 mm (⅛ in.) in height. After inflation to 110 percent of the maximum recommended inflation pressure, the tire shall remain intact on the rim, including while under test and side-loaded with 2000 N (450 lbf) in accordance with the rim test, § 1512.18(j). Tubular sew-up tires and nonpneumatic tires are exempt from this requirement.

§ 1512.11 Requirements for wheels.

(a) *Spokes.* There shall be no missing spokes.

(b) *Alignment.* The wheel assembly shall be aligned such that no less than 1.6 mm (1/16 in.) clearance exists between the tire and fork or any frame member when the wheel is rotated to any position.

(c) *Rims.* Rims shall retain the spokes and tire when side-loaded with 2000 N (450 lbf) and tested in accordance with the rim test, § 1512.18(j). Sidewalk bicycles need not meet this requirement.

§ 1512.12 Requirements for wheel hubs.

All bicycles (other than sidewalk bicycles) shall meet the following requirements:

(a) *Locking devices.* Wheels shall be secured to the bicycle frame with a positive locking device. Locking nuts or threaded axles shall require rotation of at least 180° from finger-tight condition to full tightness.

(b) *Quick-release devices.* Lever-operated quick-release devices shall be adjustable to allow setting the lever position for tightness. Quick-release levers shall be clearly visible to the rider and shall indicate whether the levers are in a locked or unlocked position. Quick-release clamp action shall emboss the frame or fork when locked.

(c) *Front hubs.* Front hubs not equipped with lever-operated quick-release devices shall have a positive retention feature that shall be tested in accordance with the front hub retention test, § 1512.18(j)(3), to assure that when the locking devices are released the wheel will not separate from the fork.

§ 1512.13 Requirements for front fork.

The front fork shall be tested for strength by application of at least 39.5 J (350 in-lb) of energy in accordance with the fork test, § 1512.18(k)(1), without visible evidence of fracture. Sidewalk bicycles need not meet this requirement.

§ 1512.14 Requirements for frame.

The fork and frame assembly shall be tested for strength by application of at least 39.5 J (350 in-lb) of energy in accordance with the frame test, § 1512.18(k)(2), without visible evidence of fracture or frame deformation that significantly limits the steering angle over which the wheel can be turned. Sidewalk bicycles need not meet this requirement.

§ 1512.15 Requirements for seat.

(a) *Seat limitation.* No part of the seat, seat supports, or accessories attached to the seat shall be more than 125 mm (5.0 in.) above the top of the seat surface at the point where the seat surface is intersected by the seat post axis.

(b) *Seat post.* The seat post shall contain a permanent mark or ring that clearly indicates the minimum insertion depth (maximum seat-height adjustment); the mark shall not affect the structural integrity of the seat post. This mark shall be located no less than two seat-post diameters from the lowest point on the post shaft, and the post strength shall be maintained for at least a length of one shaft diameter below the mark.

(c) *Adjustment clamps.* The seat adjustment clamps shall be capable of securing the seat in any position to which it can be adjusted and preventing movement of the seat in any direction under normal conditions of use. Following the road test, § 1512.18(p) (or the sidewalk bicycle proof test, § 1512.18(q), as applicable), the seat clamps shall be tested in accordance with the seat adjustment clamps and load test, § 1512.18(l).

§ 1512.16 Requirements for reflectors.

Bicycles shall be equipped with reflective devices to permit recognition and identification under illumination from motor vehicle headlamps. Sidewalk bicycles are not required to have reflectors.

(a) *Front, rear, and pedal reflectors.* There shall be an essentially colorless front-facing reflector, essentially colorless or amber pedal reflectors, and a red rear-facing reflector.

(b) *Side reflectors.* There shall be retroreflective tire sidewalls or, alternatively, reflectors mounted on the spokes of each wheel; the center of spoke-mounted reflectors shall be within 76 mm (3.0 in.) of the inside of the rim. Spoke-mounted reflectors shall be visible on each side of the wheel.

(c) *Front reflector.* The reflector or mount shall not contact the ground plane when the bicycle is resting on that plane in any orientation. The optical axis of the reflector shall be directed forward within 5° of the horizontal-vertical alignment of the bicycle when the wheels are tracking in a straight line. The reflectors and/or mounts shall incorporate a provision to preclude assembly in other than the intended manner. The front reflector shall be tested in accordance with the reflector mount and alignment test, § 1512.18(m), to assure the reflector alignment cannot be altered by a force of 89 N (20 lbf) applied to either the reflector or mounting device at any point and in any direction.

(d) *Rear reflector.* The reflector or mount shall not contact the ground plane when the bicycle is resting on that plane in any orientation. The reflector shall be mounted such that it is to the rear of the seat with the top of the reflector at least 76 mm (3.0 in.) below the point on the seat surface that is intersected by the line of the seat post. The optical axis of the reflector shall be directed rearward within 5° of the horizontal-vertical alignment of the bicycle when the wheels are traveling in a straight line. The reflectors and/or mounts shall incorporate a provision to preclude assembly in other than the intended manner. The rear reflector shall be tested in accordance with the reflector mount and alignment test, § 1512.18(m), to assure that the reflector alignment will not be affected when a force of 89 N (20 lbf) is applied to either the reflector or the mounting device at any point in any direction.

(e) *Pedal reflectors.* Each pedal shall have reflectors located on the front and rear surfaces of the pedal. The reflector elements may be either integral with the construction of the pedal or mechanically attached, but shall be sufficiently recessed from the edge of the pedal, or of the reflector housing, to prevent contact of the reflector element with a flat surface placed in contact with the edge of the pedal.

(f) *Side reflectors.* Reflectors affixed to the wheel spokes shall be mounted either flat on the spokes or within the spoke cage such that the angle between the optical axis and the normal to the plane of the wheel shall not exceed the angle of the spokes with the plane of the wheel. The reflectors shall not interfere with any wheel adjustments. The side-mounted reflector devices shall be essentially colorless or amber on the front wheel and essentially colorless or red on the rear wheel.

(g) *Reflector tests.* The pedal, front-mount, rear-mount, and side-mount reflectors shall be tested in accordance with the reflector test, § 1512.18(n), to assure the reflectance values over the angles given in tables 1 and 2.

(h) *Retroreflective tire sidewalls.* When retroreflective tire sidewalls are used in lieu of spoke-mounted reflectors, the reflecting material shall meet the following requirements:

(1) The retroreflective material shall form a continuous circle on the sidewall.

(2) The retroreflective material shall adhere to the tire such that after the tire has been subjected to a temperature of 50°±3° C (120°±5° F) for 30 minutes, the retroreflective material cannot be peeled or scraped away without removal of tire material.

(3) The retroreflective material shall be as resistant to abrasion as is the adjacent sidewall material so that when retroreflective material is removed from the inflated tire by abrasion with a wet, steel bristle brush, tire material will be removed along with the retroreflective material.

(4) The retroreflective material shall be tested for performance in accordance with the retroreflective tire test, § 1512.18(o), to assure the reflectance properties over the angles given in table 3. When a portion of the retroreflective material is selected (and the remainder is masked as specified in § 1512.18(o)(2)(i)), the selected portion shall not contact the ground plane when the assembled bicycle is resting on that plane in any orientation.

§ 1512.17 Other requirements.

(a) *Road test.* Bicycles, other than sidewalk bicycles, shall be ridden at least 6.4 km (4.0 mi.) by a rider weighing at least 68.1 kg (150 lb.) and travel five times over a 30 m (100 ft.) cleated course in accordance with the road test, § 1512.18(p), and shall exhibit stable handling, turning, and steering characteristics without difficulty of operation. There shall be no system or component failure of the structure, brakes, or tires, and there shall be no loosening or misalignment of the seat, handlebars, controls, or reflectors during or resulting from this test.

(b) *Sidewalk bicycle proof test.* Sidewalk bicycles shall be dropped a distance of at least 300 mm (1.0 ft.) three times onto a paved surface with weights attached in accordance with the sidewalk bicycle proof test, § 1512.18(q). There shall be no fracture of wheels, frame, seat handlebars, or fork during or resulting from this test.

(c) *Ground clearance.* With the pedal horizontal and the pedal crank in its lowest position and any training wheels removed, it shall be possible to tilt the bicycle at least 25° from the vertical without the pedal or any other part (other than tires) contacting the ground plane.

(d) *Toe clearance.* Bicycles not equipped with positive foot-retaining devices (such as toe clips) shall have at least 88 mm (3½ in.) clearance between the pedal and the front tire or fender (when turned to any position). The clearance shall be measured forward and parallel to the longitudinal axis of the bicycle from the center of either pedal to the arc swept by the tire or fender, whichever results in the least clearance.

§ 1512.18 Test and test procedures.

(a) *Sharp edge test.* [Reserved]

(b) *Exposed protrusion test.* (Ref. § 1512.4(e))

(1) *Apparatus.* A cylinder of 88 mm (3¼ in.) diameter and 250 mm (10 in.) length.

(2) *Procedure.* All protrusions greater than 7.8 mm (5/16 in.) in length which terminate in less than a full 6.3 mm (¼ in.) radius shall be located and tested with the test apparatus to determine whether the protrusions can be brought into contact with the surface of the cylinder. Any protrusion of the dimensions specified that can be brought into contact with the cylinder are exposed protrusions.

(c) *Protective cap and end-mounted devices test.* (Ref. § 1512.4 (f) and (i), § 1512.6(d).) Any device suitable for exerting a removal force of at least 67 N (15 lbf) for protective caps and 8.9 N (2.0 lbf) for end caps at any point and in any direction may be used. All protective caps and end-mounted handlebar devices shall be tested to determine that they cannot be removed by application of the specified forces.

(d) *Handbrake loading and performance test.* (Ref. § 1512.5(b).)

(1) *Apparatus.* A spring scale or other suitable device for measuring the specified forces on the handbrake levers and a dry, clean, level, paved surface of adequate length.

(2) *Procedure.* The loading test, § 1512.18(d)(2)(i), and the rocking test, § 1512.18(d)(2)(iii), shall be performed before the performance test, § 1512.18(d)(2)(v), is performed and no adjustments shall be made between these tests.

(i) *Loading test procedure.* The hand levers shall be actuated with a force applied at a point no more than 25 mm (1.0 in.) from the open end of the lever. If the hand lever contacts the handlebar (bottoms) before a force of 445 N (100 lbf) is reached, the loading may be stopped at that point, otherwise the loading shall be increased to at least 445 N (100 lbf). Application of the loading force shall be repeated for a total of 10 times and all brake components shall be inspected.

(ii) *Loading test criteria.* There shall be no visible fractures, failures, misalignments, and clearances not in compliance with applicable parts of § 1512.5.

(iii) *Rocking test procedure.* A weight of at least 68.1 kg (150 lb) shall be placed on the seat; the force required for the hand levers to contact the handlebars, or 445 N (100 lbf), as determined in 1512.18(d)(2), shall be applied to the hand levers; and the bicycle shall be rocked forward and backward over a dry, clean, level, paved surface at least six times and for a distance of at least 3 inches in each direction.

(iv) *Rocking test criteria.* There shall be no loosening of the brake pads, pad holders, or cable and hand-lever securing devices or any other functional brake component.

(v) *Performance test procedure.* The bicycle shall be ridden over a dry, clean, level paved test course and, after attaining the specified ground speed, shall be stopped by the rider while remaining in a normal riding position throughout the stop and using only the brake system

under test. The stopping distance shall be measured. The stopping distances specified are based on a rider weight of 68.1 kg (150 lb) and greater stopping distances are allowable for heavier riders at the rate of 0.30 m per 4.5 kg (1.0 ft per 10 lb).

(vi) *Performance test criteria.* The stopping force applied to the hand lever at a point no closer than 25 mm (1.0 in.) from the open end shall not exceed 180 N (40 lbf). Bicycles with an equivalent ground speed in excess of 24 km/hr (15 mph) (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute) shall stop from an actual test speed of 24 km/hr (15 mph) or greater within a distance of 4.5 m (15 ft); when the equivalent ground speed is less than 24 km/hr (15 mph) under the same conditions, the bicycle shall stop from an actual test speed of 16 km/hr (10 mph) or greater within a distance of 4.5 (15 ft).

(e) *Footbrake force and performance test.* (Ref. § 1512.5(c) (1) and (2))

(1) *Apparatus.* Suitable devices for exerting and measuring the required forces and a dry, clean, level, paved surface of adequate length.

(2) *Force test.* The braking force shall be measured as the wheel is rotated in a direction of forward motion, and the braking force is measured in a direction tangential to the tire during a steady pull and after ½ to 1 revolution of the wheel. The brake shall be capable of producing a linearly proportional (within 20 percent) brake force for a gradually applied pedal force from 89 N to 310 N (20 to 70 lbf) and shall not be less than 180 N (40 lbf) for an applied pedal force of 310 N (70 lbf).

(3) *Performance test.* The procedure of § 1512.18(d)(2)(v) shall be followed to test the footbrake performance. The stopping distance shall be less than 4.5 m (15 ft.) from an actual test speed of 16 km/hr (10 mph). In addition, if the equivalent ground speed is in excess of 24 km/hr (15 mph) (in its highest gear ratio at a pedal crank rate of 60 revolutions per minute), the stopping distance shall be 4.5 m (15 ft.) from an actual test speed of 24 km/hr (15 mph) or greater.

NOTE: No allowances shall be made for rider weight.

See 1512.5(d) for additional requirements for bicycles with both handbrakes and footbrakes.

(f) *Sidewalk bicycle footbrake force test.* For sidewalk bicycles, the Footbrake force test is the same as for bicycles except: the brake force transmitted to the rear wheel shall continually increase as the pedal force is increased from 44.5 N to 225 N (10 to 50 lbf). The ratio of applied pedal force to braking force shall not be greater than two-to-one.

(g) *Handlebar stem test.* (Ref. § 1512.6(b))

(1) *Procedure.* The handlebar stem shall be tested for strength by applying a force of 2000 N (450 lbf), in a forward direction, for bicycles, or 1000 N (225 lbf) for sidewalk bicycles, at a point in line with the handlebar attachment point and at an angle of 45° from the stem centerline (See fig. 2).

(2) *Criteria.* No visible fractures shall result from this test.

(h) *Handlebar test.* (Ref. § 1512.6(e))

(1) *Stem-to-fork clamp test.*

(i) *Procedure.* The handlebars shall be in place on the bicycle and secured according to manufacturers' instructions. The handlebars shall be subjected to a torque applied about the axis of the stem.

(ii) *Criteria.* The stem-to-fork clamps shall prevent movement of the stem when a torque of 67.5 N-m (50 ft-lb) is applied for bicycles or 47.2 N-m (35 ft-lb) for sidewalk bicycles.

(2) *Handlebar strength and clamp test*—(i) *Procedure.* The stem shall be in place on the bicycle or in an equivalent test fixture and secured according to manufacturers' instructions. A load shall be applied equally to each handlebar end in a direction to cause the greatest torque about the handlebar-to-stem clamp; deflection shall be measured along the line of applied force.

(ii) *Criteria.* The handlebars shall support a force of no less than 445 N (100 lbf) or absorb no less than 22.6 J (200 in-lb) of energy through a maximum deflection of no more than 76 mm (3.0 in.); the handlebar clamp shall prevent rotational movement of the handlebars relative to the clamp, and there shall be no visible fractures.

(i) *Pedal slip test.* [Reserved]

(j) *Rim test.* (Ref. §§ 1512.10 and 1512.11(c))

(1) *Procedure.* Only one wheel need be tested if the front and rear wheel are of identical construction. The wheel to be tested shall be removed from the bicycle and be supported circumferentially around the tire sidewall. A load of 2000 N (450 lbf) shall be applied to the axle and normal to the plane of the wheel for at least 30 seconds. If the wheel hub is offset, the load shall be applied in the direction of the offset.

(2) *Criteria.* The wheel and tire assembly shall be inspected for compliance with the requirements of § 1512.11(a) and shall be remounted on the bicycle according to the manufacturer's instructions and shall turn freely without roughness and shall comply with the requirement of § 1512.11(b).

(3) *Front hub retention test.* (Ref. § 1512.12(c))

(i) *Procedures.* Front hub locking devices shall be released. When threaded nuts and axles are used, the nuts shall be opened at least 360° from a finger tight condition. A separation force of at least 11.2N (25 lbf) shall be applied to the hub on a line along the slots in the fork ends.

(ii) *Criteria.* The front hub shall not separate from the fork; fenders, mudguards, struts, and brakes shall not be allowed to restrain the separation.

(k) *Fork and frame test.* (Ref. §§ 1512.13 and 1512.14)

(1) *Fork test.*

(i) *Procedure.* With the fork stem supported in a 76 mm (3.0 in.) vee block and secured by the method illustrated in figure 1, a load shall be applied at the axle attachment in a direction perpindicular of the center line of the stem and against the direction of the rake. Load and deflection readings shall be recorded and plotted at the point of loading. The load shall be increased until a deflection of 64 mm (2½ in.) is reached.

(ii) *Criteria.* Energy of at least 39.5 J (350 in-lb) shall be absorbed with a deflection in the direction of the force of no more than 64 mm (2½ in.).

(2) *Frame test.*—(i) *Procedure.* The fork, or one identical to that tested in accordance with the fork test, 1512.18(k)(1), shall be replaced on the bicycle in accordance with the manufacturer's instructions; and a load of 890 N (200 lbf), or an energy of at least 39.5 J (350 in-lb), whichever results in the greater force, shall be applied to the fork at the axle attachment point against the direction of the rake in line with the rear wheel axle.

(ii) *Criteria.* There shall be no visible evidence of fracture and no deformation of frame that significantly limits the steering angle over which the front wheel can be turned.

(l) *Seat adjustment clamps and load test.* (Ref. § 1512.15(c))

(1) *Procedure.* A force of at least 668 N (150 lbf) shall be applied vertically downward (334 N (75 lbf) for sidewalk bicycles) to a point within 25 mm (1.0 in.) from either the front or rear of the sea, whichever produces the greatest torque on the seat clamp. After removal of this force, a force of 222 N (50 lbf) shall then be applied horizontally (111 N (25 lbf) for sidewalk bicycles) to a point within 25 mm (1.0 in.) from either the front or rear of the seat, whichever produces the greatest torque on the clamp.

(2) *Criteria.* No movement of the seat with respect to the seat post, or of the seat post with respect to the bicycle frame, shall have resulted from application of the forces specified.

(m) *Reflector mount and alignment test.* (Ref. § 1512.16 (c) and (d))

(1) *Procedure.* A force of 89 N (20 lbf) shall be applied to the reflector mount in at least three directions selected as most likely to affect its alignment. At least one of those directions shall be selected to represent a force that would be expected in lifting the bicycle by grasping the reflector.

(2) *Criteria.* The optical axis of the reflector shall remain within 5° of the intersection of a plane containing the center of both wheels and seat stem and a line parallel to that containing the center of both wheels.

(n) *Reflector test.* (Ref. § 1512.16(g))

(1) *Conditioning.* The following conditioning in the order given shall be performed prior to testing for performance.

(i) *Warpage conditioning.* The reflector shall be held in a preheated oven for at least one hour at 50°±5° C (120°±3° F). A pedal reflector may be conditioned integrally with its pedal.

(ii) *Mechanical impact conditioning.* The reflector shall be mounted faceup in a manner similar to the way in which it

is mounted on the bicycle. A 13 mm (½ in.) diameter polished steel ball shall be dropped normal to the center of the face of the reflector from a height of 0.76 m (30 in.). The ball may be guided by a tube with holes, but not restricted in free fall. Pedal reflectors are exempt from this impact conditioning.

(iii) *Moisture conditioning.* The reflector shall be submerged in tap water in a suitable container. The container shall be pressurized in 17.2 kN/m² (2.5 psi) (equivalent to 1.7 m (5¾ ft.)) of water for 15 minutes and then released.

(2) *Reflector performance test.* (i) Arrangements for the reflector performance test shall be as shown in figure 3 and the distance D between the light source and the reflector shall be 30 m (100 ft.). The source of illumination shall be a lamp with a 51 mm (2.0 in.) effective diameter and a filament operating at 2,856±10 percent color temperature. The observation point shall be colocated (as close as practicable) with the source of illumination. The reflector shall be mounted with the center of the reflector at the center of rotation and at the same horizontal level as the source of illumination. Photometric measurements shall be made at the observation angles and entrance angles given in tables 1 and 2.

(ii) The observation angle is the angle formed by a line from the point of observation to the center of the reflector with a second line from the center of the reflector to the source of illumination. The entrance angle is the angle between a line normal to the center of the reflector and a line from the center of the reflector to the source of illumination. The entrance angle shall be designated left, right, up, and down in accordance with the position of the source of illumination with respect to the axis of the reflector as viewed from behind the reflector.

(iii) Photometric measurements shall be made either visually or photoelectrically. With either method, the light reflected to the observation point shall be determined. Also, the illumination on the reflector from the source shall be measured.

(iv) For visual measurements a comparison lamp, emitting red light similar in spectral quality to the reflector, shall be located adjacent to the reflector (at an angle not to exceed ½°) and arranged so that the candlepower can be varied from 0.01 to 0.25 to make the intensity duplicate that of the reflector under test. Means shall be provided to change the intensity of the source of illumination without changing the filament color temperature. The comparison lamp shall be designed to avoid reflection from the source of illumination back in the direction of the observer. It shall be of such size and so diffused that when viewed by the observer (through a 2½× reducing monocular), the candlepower can be readily compared and adjusted to that of the reflector. The observer shall have at least 10 minutes of dark adaption before making observations. For photoelectric measurements, the opening to the photocell shall not be more than ½ inch vertical by 1 inch horizontal.

(v) Reflectors that mount on the bicycle in a fixed rotational position with respect to the bicycle, or the bicycle component on which they are mounted (such as pedals or spokes), shall be tested with a single orientation. Reflectors that do not mount on the bicycle in a fixed rotational position with respect to the bicycle shall be rotated about their axis through 360° to find the minimum candlepower per footcandle for each test point. If the measurement falls below the minimum requirement at any test point, the reflector shall be rotated ±5° about its axis from the angle where the minimum occurs, and the maximum candlepower per footcandle within this angle shall be the measured value.

(vi) Should uncolored reflections from the front surface interfere with photometric readings at any test point the lowest reading and location within 1° above, below, right, and left of the test point shall meet the minimum requirement for the test point.

(vii) A recommended coordinate system for definition of color is the "Internationale de l'Eclairage (CIE 1931)" system in the *IES Lighting Handbook* [8], fifth edition, 1972. Recommended color boundaries in this coordinate system are: For red, $y=0.980-x$ and $y=0.335$; for yellow, $y=0.382$, $y=0.790-0.667x$, and $y=x-0.120$.

(o) *Retroreflective tire test.* (Ref. § 1512.16(h)).

(1) *Apparatus.* Arrangements for the reflective intensity measurement shall be as shown in figure 3. A light projector (having a maximum lens diameter of D/500, where D is the distance from the source to the sidewall being measured) capable of projecting light of uniform intensity shall be used to illuminate the sample. The light falling on the sample shall have a color temperature of 2856K±10% (equivalent to a tungsten filament lamp operated at a color temperature of 2856K±10% having approximately the relative energy distribution given in table 4). The light reflected from the test surface shall be measured with a photoelectric receiver, the response of which has been corrected for the spectral sensitivity of the average photopic human eye. The dimensions of the active area of the receiver shall be such that no point on the perimeter is more than d/1000 (where d is the distance from the receiver to the sidewall). Tires to be tested shall be mounted on a wheel, the rim and spokes of which have been masked in flat black so that when measured without the tire they indicate no appreciable reflectance. The tire shall be mounted and fully inflated. Distances shall be measured from the point of intersection of the axle of the wheel with the center of the wheel. For the tests, the distance D between the projector and the center of the wheel and distance d between the center of the wheel and the receiver shall each be at least 15 m (50 ft.).

(2) *Procedure.*—(i) *Masking.* The reflecting strip to be tested shall be within two concentric circles, the larger of which is no more than 0.02 m (0.79 in.) greater in radius than the smaller. While additional reflecting material is permitted outside such boundaries, such additional material shall not be counted in determining the average width of the reflecting strip and shall be masked off with opaque, matte black tape in testing the reflecting material.

(ii) *Orientation.* With the tire mounted and inflated, every position of the reflecting strip to be tested shall be oriented so that the normal to this portion is within 40° of parallel to the axis of rotation of the wheel.

(iii) *Measurement.* Measure the distance from the receiver to the specimen (the minimum diameter of the unmasked reflective strip). Measure the illumination incident on the reflective strip at uniform intervals of no more than 45° around the wheel, with the receiver oriented in the direction of the incident radiation. The average of such readings will be the mean illumination of the sample E_S. If any one of such reading differs by more than 10 percent from the mean illumination, then a more uniform source must be obtained. Measure the illumination on the receiver due to reflection from the sidewall for each entrance angle and each observation angle given in table 3. The illumination incident on the test surface and the receiver shall be measured in the same units on a linear scale. Compute the ratio A for each combination of entrance angle and observation angle listed in table 3 as follows:

$$A=\frac{E_T}{E_S}\times\frac{d^2}{r}$$

Where:

E_T = Illumination incident upon the receiver,

E_S = Illumination incident upon a plane perpendicular to the incident ray at the specimen position (see instructions above for averaging), measured in the same units as E_T,

d = The distance from the receiver to the center of the wheel in meters,

r = The minimum radius of the boundary circles of the retroreflective strip in meters.

The value of A shall be greater than that listed in table 3 for each combination of entrance angle and observation angle.

(iv) *Criteria.* The mathematical description of the reflective properties as given by the ratio A shall serve as the measure of performance required of the sidewall reflector. Alternatively, the reflective material shall satisfy the following definition without regard to the ratio A. The average reflectance factor $\bar{P}$ of

[8] Copies may be obtained from Illuminated Engineering Society, 345 East 47th Street, New York, New York 10017.

the sidewall measured over 0.02 m (0.79 in.) radial strip shall be not less than:

$$P=\frac{100}{1+\left(\frac{\phi}{0.225}\right)^{3/2}}$$

here ϕ is the angle of observation. The reflectance factor shall be defined relative to a perfect white diffusing reflector. The formula above shall apply for entrance angles up to 40° and observance angles ϕ of 0.2° to 1.5°. The reflectance is not specified beyond these limiting angles.

(p) *Road test.* (Ref. §§ 1512.15(c) and 1512.17(a))

(1) *Procedure.* The bicycle shall be ridden at least 6.4 km (4.0 mi.) by a rider weighing at least 68.1 kg (150 lb.) with the tires inflated to maximum recommended pressure. Travel shall include riding the bicycle five times over a 30 m (100 ft.) course of wooden cleats fastened to a paved surface. The cleats shall be a full 25 mm (1.0 in.) high by 51 mm (2.0 in.) wide lumber with a 12 mm by 12 mm (½ in. by ½ in.) chamfer of 45° on the corners contacting the tires. The cleats shall be spaced every 1.8 m (6.0 ft.) over the 30 m (100 ft.) course. The bicycle shall be ridden over the cleated course at a speed of at least 24 km/hr (15 mph) with the rider firmly seated.

(2) *Criteria.* The bicycle shall exhibit stable handling, turning, and steering characteristics without difficulty of operation. There shall be no system or component failure of the structure, brakes, or tires and there shall be no loosening or misalignment of the seat, handlebars, controls, or reflectors.

(q) *Sidewalk bicycle proof test.* (Ref. §§ 1512.15(c) and 1512.17(b)).

(1) *Procedure.* The bicycle shall be loaded with weights of 14 kg (30 lb.) on the seat surface and 4.5 kg (10 lb.) attached to the end of each handle grip for a total lead of 22 kg (50 lb.). The bicycle shall be lifted a distance of 0.3 m (1.0 ft.) and dropped (while maintaining an upright position) three times onto a paved surface. Following this and with weight removed, it shall be allowed to fall in any configuration and attitude from an upright position to the paved surface three times on each side.

§ 1512.19 Instructions and labeling.

A bicycle shall have an instruction manual attached to its frame or included with the packaged unit.

(a) The instruction manual shall include at least the following:

(1) Operations and safety instructions describing operation of the brakes and gears, cautions concerning wet weather and night-time operation, and a guide for safe on-and-off road operation.

(2) Assembly instructions for accomplishing complete and proper assembly.

(3) Maintenance instructions for proper maintenance of brakes, control cables, bearing adjustments, wheel adjustments, lubrication, reflectors, tires and handlebar and seat adjustments; should the manufacturer determine that such maintenance is beyond the capability of the consumer, specifics regarding locations where such maintenance service can be obtained shall be included.

(b) A bicycle less than fully assembled and fully adjusted shall have clearly displayed on any promotional display material and on the outside surface of the shipping carton the following: (1) A list of tools necessary to properly accomplish assembly and adjustment, (2) a drawing illustrating the minimum leg-length dimension of a rider and a method of measurement of this dimension.

(c) The minimum leg-length dimension shall be readily understandable and shall be based on allowing no less than one inch of clearance between (1) the top tube of the bicycle and the ground plane and (2) the crotch measurement of the rider. A girls' style frame shall be specified in the same way using a corresponding boys' model as a basis.

§ 1512.20 Separability.

If any section or portion thereof of this Part 1512 or its application to any person or circumstance is held invalid, the remainder of the section(s) and its (their) application to other persons or circumstances is not thereby affected.

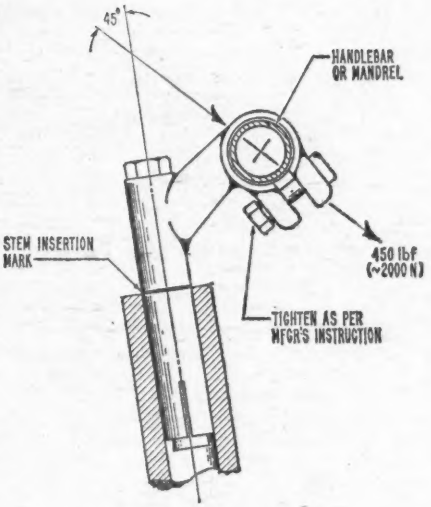

FIG 2—HANDLEBAR STEM LOADING

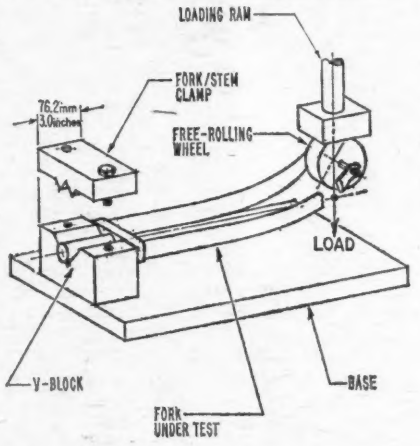

FIG 1—BICYCLE FRONT FORK CANTILEVER BENDING TEST RIG

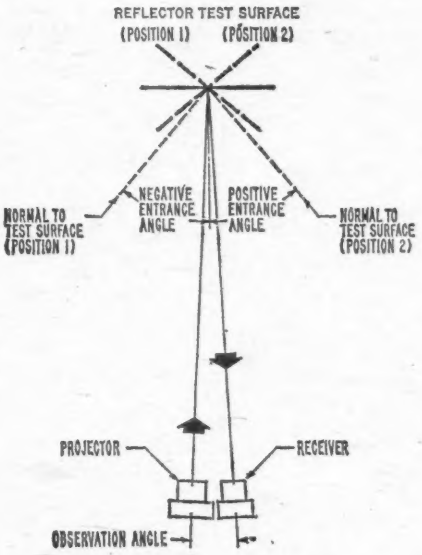

FIG 3—ENTRANCE & OBSERVATION ANGLES

TABLE 1.—*Minimum candlepower per incident foot-candle for clear reflector* [1]

Observation angle	Front, rear, and side reflectors; entrance angle in degrees			Pedal reflectors; entrance angle in degrees		
	0	10 up/down	20 left/right	0	10 up/down	20 left/right
0.2	27.0	18.0	9.0	7.5	6.0	3.0
.3				6.0	4.8	2.4
1.5	.28	.20	.12	.28	.20	.12

[1] Amber values shall be ⅓×clear values. Red values shall be ¼×clear values.

TABLE 2.—*Minimum candlepower per incident foot-candle for clear reflector* [1]

Observation angle	Front, rear, and side reflectors; entrance angle in degrees		
	30 left/right	40 left/right	50 left/right
0.2	8.0	7.0	6.0
1.5	.12	.12	.12

[1] Amber values shall be ⅓×clear values. Red values shall be ¼×clear values.

TABLE 3.—*Minimum acceptable values for the quantity A defined in the retroreflective tire test procedure*

Observation angle (degrees)	Entrance angle (degrees)	Minimum acceptable value of A	
		Meters	Feet
0.2	−4	2.2	7.25
.2	20	1.9	6.27
.2	40	1.3	4.29
1.5	−4	.22	.73
1.5	20	.19	.63
1.5	40	.13	.43

TABLE 4.—*Relative energy distribution of sources*

Wavelength (nanometers)	*Relative energy*	*Wavelength (nanometers)*	*Relative energy*
380	9.79	410	17.68
390	12.09	420	21.00
400	14.71	430	24.67

TABLE 4.—*Relative energy distribution of sources*

Wavelength (nanometers)	*Relative energy*	*Wavelength (nanometers)*	*Relative energy*
440	28.70	610	136.34
450	33.09	620	143.62
460	37.82	630	150.83
470	42.87	640	157.98
480	48.25	650	165.03
490	53.91	660	171.96
500	59.86	670	178.77
510	66.06	680	185.43
520	72.50	690	191.93
530	79.13	700	198.26
540	85.95	710	204.41
550	92.91	720	210.36
560	100.00	730	216.12
570	107.18	740	221.66
580	114.44	750	227.00
590	121.73	760	232.11
600	129.04		

Effective date. The regulations promulgated above, 16 CFR 1500.18(a)(12) and Part 1512, shall become effective January 1, 1975.

(Secs. 2(f)(1)(D), (q)(1)(A), (s), 3(e)(1), 74 Stat. 372, 374, 375, as amended 80 Stat. 1304–05, 83 Stat. 187–89 (15 U.S.C. 1261, 1262))

Dated: June 28, 1974.

SADYE E. DUNN,
Secretary, Consumer Product Safety Commission.

[FR Doc.74-15315 Filed 7-15-74;8:45 am]

CONSUMER PRODUCT SAFETY COMMISSION

[16 CFR Part 1512]

BICYCLE LABELING

Compliance With Safety Regulations

Published elsewhere in this issue of the FEDERAL REGISTER (p. 26098) is a CPSC document promulgating regulations (16 CFR Part 1512) establishing safety requirements for bicycles and a regulation (16 CFR 1500.18(a)(12) banning the introduction of bicycles into interstate commerce after January 1, 1975, that do not meet the safety requirements of Part 1512.

The Commission anticipates that bicycles introduced into interstate commerce before January 1, 1975, and not manufactured to conform with the requirements of Part 1512, will be available for a period of time after that date for sale to consumers in retail outlets.

To assist consumers who wish to know when making a purchasing decision, whether a bicycle meets the safety requirements of Part 1512, the Commission proposes to require for two years after January 1, 1975, that bicycles subject to Part 1512 be labeled to show they meet the requirements.

Such bicycles offered for sale to consumers in a fully assembled condition would bear a label (such as a hang tag) stating "Meets U.S. Consumer Product Safety Commission Safety Regulations for Bicycles." The retail cartons of such bicycles offered for sale to consumers in an unassembled or partially assembled condition would be labeled with the same statement.

Accordingly, pursuant to provisions of the Federal Hazardous Substances Act (secs. 2 (f)(1)(D), (q)(1)(A), (s), 3(e)(1), 74 Stat. 372, 374, 375, as amended 80 Stat. 1304–05, 83 Stat. 187–89; 15 U.S.C. 1261, 1262) and under authority vested in the Commission by the Con-Consumer Product Safety Act (Public Law 92–573, sec. 30(a), 86 Stat. 1231; 15 U.S.C. 2079 (a)), the Commission proposes to add a new paragraph (d) to 16 CFR 1512.19 as follows:

§ 1512.19 Instructions and labeling.

* * * * *

(d) Every bicycle subject to the requirements of this Part 1512 and introduced into interstate commerce on or after January 1, 1975, through December 31, 1976, shall be labeled with the statement "Meets U.S. Consumer Product Safety Commission Safety Regulations for Bicycles."

(1) Every such bicycle, displayed or offered for sale to consumers in a fully assembled condition, shall bear a label (such as a hang tag) at least 6.4 centimeters (2½ inches) by 17.8 centimeters (7 inches) setting forth the required labeling statement legibly and conspicuously in capital letters at least 0.6 centimeter (¼ inch) high. No other words or symbols may appear on the label.

(2) The required labeling statement shall appear legibly and conspicuously in capital letters at least 1.3 centimeters (½ inch) high on the retail carton of every such bicycle offered for sale to consumers in an unassembled or partially assembled condition.

Interested persons are invited to submit, on or before August 15, 1974, written comments regarding this proposal. Comments and any accompanying data or material should be submitted, preferably in five copies, addressed to the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207. Comments may be accompanied by a memorandum or brief in support thereof. Received comments may be seen in the Office of the Secretary, 10th floor, 1750 K Street NW., Washington, D.C., during working hours Monday through Friday.

Dated: June 28, 1974.

SADYE E. DUNN,
Secretary, Consumer Product Safety Commission.

[FR Doc.74–15314 Filed 7–15–74;8:45 am]